PHASE II RFI DATA SUMMARY REPORT

HONEYWELL DELAWARE VALLEY WORKS FACILITY
CLAYMONT, DELAWARE

Prepared for:

Honeywell International

Prepared by:

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Revised by:

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May 2005

Revised December 2005

MACTEC

December 6, 2005

Mr. Russell H. Fish, Project Manager
US Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Via Email and US Mail

Subject: **Honeywell International Inc. – Claymont, Delaware**
RFI Phase II Data Summary Report
Response to USEPA Comments Letter dated October 7, 2005
MACTEC Project No. 3485050043

Dear Mr. Fish:

On behalf of Honeywell International Inc., MACTEC Engineering and Consulting, Inc. (MACTEC) has prepared this letter in response to the US Environmental Protection Agency's (USEPA) October 7, 2005 comment letter in connection with the Phase II RFI Data Summary Report that was prepared by Montgomery Watson Harza (MWH) for Honeywell's Claymont, Delaware facility. The revised tables and figures, as well as corrected pages to the text of the Phase II RFI report are attached to this letter. Also attached to this response letter are the soil boring logs (see Appendix D).

For ease of review, provided below is an item-by-item response to the USEPA's specific comments contained in their October 7th letter.

USEPA – SPECIFIC COMMENTS

1. *USEPA Comment: Acetone and Butanone were frequently rejected. In addition, 1,4-Dioxane and Gamma-BHC (Lindane) were rejected on occasion. Please explain how Honeywell will address this issue in the future.*

MACTEC Response
The analytical data contained in the subject Phase II RFI report were reviewed by Validata, LLC. Based on the validation procedures performed on these data, Validata observed that the relative response factor (RRF) for several compounds was below 0.05. As per USEPA guidelines, these results were flagged as rejected. It should be noted that the 1,4-dioxane rejections were associated with the Phase I RFI data that were presented in the Phase II report. The analytical method used for the 1,4-dioxane analyses at that time was USEPA Method 8260. The analytical method used for the 1,4-dioxane analyses during the Phase II work was Method 8270. The current analytical method should avoid future issues with the RRF of this compound.

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2. *USEPA Comment: When duplicate samples are taken, the higher of the two results should be shown on the figures in order to characterize the full extent of the contamination. Please revise figures accordingly.*

MACTEC Response
The figures were revised to include results of the duplicate samples.

3. *USEPA Comment: Groundwater: With the combining of Honeywell and General Chemical wells, duplicate well numbers are emerging. Please develop a convention to distinguish the duplicate well numbers.*

MACTEC Response
Duplicate well numbers existed for three wells (wells MW-1, MW-2, and MW-3) that were located on both the North Plant and South Plant. This may have caused confusion in the discussion of ground water data. In any event, based on drawings provided to us by General Chemical, South Plant wells MW-1, MW-2, and MW-3 have reportedly been abandoned by General Chemical, and thus should no longer be a source of confusion. The only existing wells identified as MW-1, MW-2 and MW-3 are located on the North Plant. In future discussions about historical ground water data, MACTEC will clearly describe the locations of the wells in the text.

It should be noted that well "MW-104" was incorrectly labeled on the figures in the Phase II RFI report. This well should be identified as MW-108. The figures were revised accordingly.

4. *USEPA Comment: Screening Levels: Detection limits should not exceed MCL or Ecological or Risk-Based Screening levels. Please explain how Honeywell will address this issue in the future.*

MACTEC Response
For future sampling events, the maximum acceptable MDL for each compound will be derived from the updated Soil Screening Criteria listed in Tables A-1 and A-2 (see Appendix A of the Phase II RFI Data Summary Report [May 2005]). To attempt to avoid situations where the detection limit exceeds the MCL or other applicable screening criteria, MACTEC will request that the laboratory report the limit of quantitation (LOQ) value rather than the MDL. In this manner, if a compound is present in a sample at a concentration below the detection limit (reporting limit) but above the screening criteria, it will be reported by the laboratory as an estimated value ("J" qualifier) rather than being reported as "non-detect" at the detection limit (i.e. 10U mg/kg).

5. *USEPA Comment: Tables A-1 and A-2, Soil and Groundwater Screening Criteria: Screening criteria should be rounded to the appropriate number of significant figures. Some screening benchmarks have up to nine significant figures, implying more precision*

than is actually contained in these values.

MACTEC Response
The screening criteria shown on Tables A-1 and A-2 have been revised to an appropriate number of significant figures.

6. *USEPA Comment: Reasonable surrogates are available for many constituents listed as NS or null; for example, chlordane for alpha- or gamma-chlordane; total xylenes for o-, m-, or p-xylenes; endosulfan for endosulfan I and II. Using these suggested surrogate screening values, examination of Phase II data reveal an exceedance of alpha-chlordane in soil sample 08-01 at SWMU 13 (1,100,000 ug/kg), and in groundwater sample MW-17 (0.23 ug/l) at SWMU 9 (1,100,000 ug/kg). Please respond to this comment by developing a list of appropriate surrogates for constituents currently listed as NS or null.*

MACTEC Response
As indicated by the USEPA, there are no screening values available for several compounds that were detected in samples collected during the RFI Phase II. However, MACTEC reviewed these data and identified alternative screening values for the select compounds. The alternative screening values were obtained from USEPA Region IX. If alternative screening values were still not available, potential surrogates were used. Tables A-1 and A-2 of the Phase II RFI report have been revised to show either the alternative screening values and potential surrogates for the selected compounds.

7. *USEPA Comment: Constituents for which no screening criteria are available must be included in future work; some examples of these constituents include butylbenzene (up to 2300 ug/kg), –propylbenzene (up to 5600 ug/kg), p-isopropyltoluene (up to 1900 ug/kg), all at SWMU 19.*

MACTEC Response
Constituents detected during the RFI Phase II that have no screening criteria or surrogates will be included in future sampling activities. See response to Comment 6 above.

8. *USEPA Comment: For lead in residential soil, a screening criterion of 400 ppm may be used.*

MACTEC Response
Tables A-1 and A-2 have been revised to include the residential lead screening level of 400 parts per million (ppm). Review of lead soil data shows that sample SM13-GP31-01 (659J ppm) exceeded the new residential screening value. The text was revised accordingly.

9. *USEPA Comment: Section 3.1, bullet 3 - The text states that synoptic water level data was collected from all monitoring wells on the Honeywell property and select wells on*

the General Chemical property. A review of Table 3 and Figures 3 and 4 show that the January event was more comprehensive than the December water level event. Please explain why all the wells were not sampled for water elevation and what criteria was used to exclude wells from the event.

MACTEC Response
Water levels in all the existing North Plant wells were measured during the December 2004 and January 2005 monitoring event. In addition, water levels in most of the wells in the vicinity of SWMU 9 were measured, including many of the perimeter wells in the South Plant. The network of wells selected to prepare the ground water flow maps was sufficient to depict the overall direction of horizontal ground water flow at the Claymont facility.

10. *USEPA Comment: SWMU 13 Soil - EPA agrees with Honeywell that the delineation of the extent of soil contamination at SWMU is incomplete. Further delineation is needed to the northwest, east and southeast. Some examples include, PCE is not bounded to the northwest and west; Aniline is not bounded to the southwest. Dinitrotoluene is not bounded to the east. Also, the original approach called for collecting clean samples above and below the contamination. Was the field work able to define a zone of contamination bounded by clean soil?*

MACTEC Response
It should be noted that the RFI Phase II report does not state the extent of impacted soil is incomplete. Rather, the Phase II data revised the boundaries of the subject SWMU. Soil quality conditions at SWMU 13 have been sufficiently delineated for purposes of remedy selection. Any residual soil impacts will be addressed during remedy implementation, which will be discussed in the Corrective Measures Study (CMS).

11. *USEPA Comment: Section 3.2 SWMU 13 Soil: Unlike the other SMWUs where it was suggested that "no further assessment... is warranted," or something of that nature, no conclusion was drawn here. What is the course of action for SWMU 13 soil.*

MACTEC Response
The soil remedy for SWMU 13 will be identified and described as part of the future CMS.

12. *USEPA Comment: Section 3.3, SWMU 14 soil: No discussion of metal analytical results is included in this section. Revise, along with justification for no additional delineation necessary, when TP-07 reveals concentrations of several metals above both industrial and residential screening concentrations.*

MACTEC Response
The following text will be included in the revised Phase II RFI report:

"*Arsenic was reported at a concentration above the industrial RBC in three test pits. The*

highest concentration of arsenic was reported in TP-07 (66.4 ug/kg). Iron (72,200 ug/kg), lead (1,190 ug/kg), and thallium (10.7J ug/kg) were also reported at concentrations above the industrial RBCs in TP-07. No other metals were reported above industrial RBCs."

SWMU 14 was characterized as reportedly containing waste cuprous chloride and building debris impacted with cuprous chloride. Concentrations of copper reported in soil samples collected in TP-07 were well below the industrial RBC. Based on the low levels of copper detected in soil in this area, no further delineation is warranted.

13. *USEPA Comment: SWMU 19 Soil - In Table I-1 of the Corrective Action Workplan October 2002, this unit was reported as having been backfilled with soil. The elevated pesticide detections from the 1-2 foot interval at several locations do not support this assumption. Based on the results, delineation is still incomplete to the north and northwest. Honeywell must discern whether the surface soil contamination detected in this area, is related to disposal at the unit or is a result of air releases.*

MACTEC Response
The source of the material used to backfill SWMU 19 was not documented, or the information was not readily available. However, given the similar timeframe that both SWMUs 19 and 20 were reportedly backfilled, and the proximity of SWMU 20 relative to SWMU 19, it is possible that the source of pesticides in SWMU 19 is the backfill material. The material used to backfill SWMU 20 was reportedly obtained from SWMU 9. Therefore, the source of pesticides reported in SWMU 19 appears to be related to disposal activities. Honeywell is not aware of any air release that could have contributed to the presence of pesticides at SWMU 19. Additional characterization of this SWMU is not warranted at this time.

14. *USEPA Comment: SWMU 20 Soil - Determine the source of the elevated pesticides detected at this unit, particularly at SM20-GP10?*

MACTEC Response
As stated above in response to Comment 13, it has been reported that material from SWMU 9 was used to backfill SWMU 20. A review of the soil boring logs from SWMU 20 reveals similarities to SWMU 9 material. Ground water samples collected in the SWMU 9 area have been reported to contain elevated concentrations of pesticides.

15. *USEPA Comment: Section 3.6 SWMU 20 Soil: This SWMU was listed due to its former status as a cooling pond. Had that pond leaked, boron trifluoride and iodine pentafluoride laden water would have contaminated the soil beneath the concrete slab encountered at six feet below ground level. Additional soil samples should be taken below the buried concrete pad, or Hydropunch.*

MACTEC Response
Additional samples will be collected beneath the lower concrete slab discovered at SWMU 20 to

attempt to determine the vertical extent of boron trifluoride and pentafluoride in subsurface soil.

16. *USEPA Comment: Section 3.6, SWMU 20 soil: In addition to pesticide analysis, additional delineation work should include analysis for arsenic, in consideration of the elevated levels of this metalloid measured at SWMU 20.*

MACTEC Response
MACTEC recommends that no further delineation work be performed at SWMU 20. Arsenic has been sporadically reported at concentrations in several background areas of the North Plant and appears to be in part, naturally occurring.

17. *USEPA Comment: SWMU 13 Groundwater - The absence of significantly elevated concentrations at the downgradient Hydropunch locations is unusual given the high concentration of organic constituents detected in soil and groundwater within the unit. These results may be due to the fact that the Hydropunch samples are all from the shallow zone, and the plume may be diving. Honeywell needs to install monitoring wells deeper to assess the situation.*

MACTEC Response
The absence of elevated concentrations of organic constituents detected in the Hydropunch samples downgradient SWMU 13 suggests that natural attenuation is occurring rather than any significant vertical migration. This is supported by the presence of many of the breakdown products of tetrachloroethene in ground water, such as trichloroethene, 1,2-dichloroethene, and vinyl chloride. Future ground water monitoring for biogeochemical parameters will assist in documenting the demonstration of natural attenuation.

In any event, to assess the vertical head gradient at the Claymont facility and to determine if there is a potential for vertical migration of site related constituents, water levels from shallow and deep piezometers must be obtained. Therefore, MACTEC proposes to install a temporary piezometer adjacent to well MW-01 to assist with evaluating vertical gradients at the facility. If a significant downward vertical head gradient is observed at this location, additional deep monitoring wells may be required downgradient of SWMU 13. This determination will be made in consultation with the USEPA.

18. *USEPA Comment: SWMU 15 Groundwater - While constituent concentrations for most contaminants are generally similar among SM15-GP05, SM15-GP06 and SM15-GP07, Hydropunch SM15-GP07-01 detected a significantly higher level of benzene. Review the soils data for SWMU 15 to determine whether this unit is the source of benzene detected in groundwater of if there is another source. In addition, further work is necessary to determine the horizontal and vertical extent of groundwater impacts from this unit.*

MACTEC Response
A review of the RFI Phase I and Phase II data indicates that SWMU 15 is not a source of

benzene in the ground water. Although benzene was not detected in the upgradient monitoring well MW-2, the proximity of a nearby petroleum refinery suggests the presence of a potential offsite, upgradient source of benzene.

MACTEC proposes to advance four Hydropunch ground water samples and install four temporary piezometers at two locations between existing wells MW-2 and MW-8. At each location, a shallow and deep piezometer will be installed. The purpose of the piezometers and Hydropunch samples is two-fold: (1) to further assess upgradient ground water quality conditions both in the shallow and deep water bearing zones; and (2) to assess the vertical head gradient between the shallow and deep water table zone. We anticipate that the depths of the shallow and deep Hydropunch samples/piezometers will be approximately 15 and 30 (field determined) feet bgs, respectively. The locations and depths of the piezometers and Hydropunch samples will be made in consultation with the USEPA.

19. *USEPA Comment: SWMU 15 groundwater: Hydropunch data as well as results from MW-10 reveal elevated concentrations of numerous volatile organics, while test pit data from this SWMU reveal no obvious sources for groundwater contamination. Further evaluation of groundwater and investigation of the source for the organic contamination of groundwater in this area is needed.*

MACTEC Response
See response to Comment 18.

20. *USEPA Comment: SWMU 18 Groundwater - Given the concentrations of contaminants in groundwater, Honeywell should address the contaminant source.*

MACTEC Response
Chlorobenzene was reported at a concentration above the MCL and RBC in the three Hydropunch samples collected from SWMU 18. Similarly, 1,2-dichlorobenzene, 1,2-dichloroethane, and methylene chloride were also reported in Hydropunch samples collected in SWMU 18 at levels exceeding the MCL or RBC. However, the concentrations of these compounds detected in soil samples collected from SWMU 18 were well below both the residential and industrial RBC screening values. Although the ground water quality in the area of SWMU 18 is impacted, it does not appear that the SWMU 18 is continuing source of ground water impacts. Future ground water monitoring will continue to characterize ground water quality throughout the North Plant.

21. *USEPA Comment: Monitored Natural Attenuation - Section 3.8 states that MNA is believed to be the long-term groundwater strategy. While MNA may be a component the groundwater cleanup, this approach would only be acceptable after the sources of groundwater contamination are addressed. Significant sources are known to be present at several SWMUs in the north plant.*

MACTEC Response
MACTEC agrees with the USEPA's comment that MNA may be a component of the long term ground-water strategy. Data collected during the Phase I and Phase II RFIs have addressed the sources of ground water impacts at the North Plant. As described in this response letter, additional characterization will be completed in selected SWMUs as part of the next phase of the RFI. Final remedy selection will be defined in the CMS.

22. *USEPA Comment: Figures - The figures should include the results from duplicate analysis.*

MACTEC Response
The revised figures will include the results of the duplicate samples.

23. *USEPA Comment: Figure 3: The value for EWL-6 does not fit with contour lines. Please revise.*

MACTEC Response
The water level contour line on Figure 3 has been revised accordingly.

24. *USEPA Comment: Boring Logs - All the soil boring logs should be included as an appendix.*

MACTEC Response
Soil boring logs from the Phase II RFI work are included in Appendix D of the report revision.

25. *USEPA Comment: Table 9: Subsurface soil sampling results are not included on the corresponding figure. Please revise.*

MACTEC Response
Soil sample SW14-SURFACE-01 collected from SWMU 14 was inadvertently not shown on the corresponding figure. The figure has been revised accordingly.

26. *USEPA Comment: Monitoring Well Groundwater Results, Table 26 and Figure 20: The heptachlor epoxide value of 800 ppb in MW-01 should be flagged on Table 26 as exceeding the MCL and RBC, as well as on Figure 20, north Plant GW analytical results for organics.*

MACTEC Response
Table 26 and Figure 20 will be revised to reflect the elevated heptachlor epoxide results in MW-01.

27. *USEPA Comment:* *Appendix B: An exceedance of the holding time was noted four times in the appendix. This variable should be controllable. Please discuss procedure to eliminate this problem in the future.*

MACTEC Response
Sample holding times will be reviewed and discussed with field staff prior to conducting future field activities in order to make appropriate arrangements to avoid exceeding sample holding times.

CLOSING
If you have any questions or need additional information, please do not hesitate to call.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.

James Ryan, EIT
Project Engineer

Douglas J. Newton, PG
Sr. Principal Hydrogeologist

cc: Prashant Gupta – Honeywell

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ACRONYMS AND ABBREVIATIONS

BF_3	boron trifluoride
bgs	below ground surface
ft	foot, feet
LLI	Lancaster Laboratories, Inc.
MNA	monitoring natural attenuation
MSL	mean sea level
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
SVOCs	Semi-Volatile Organic Compounds
SWMUs	Solid Waste Management Units
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

This document presents the results of the *Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)* for the Honeywell International Inc. (Honeywell, formerly AlliedSignal) facility (Facility) in Claymont, Delaware (Figure 1). The RFI was performed as required by the USEPA Region III's Facility Lead Corrective Action Agreement, in accordance with Honeywell's Letter of Commitment (January 20, 2000) and the *RCRA Facility Lead Corrective Action Reference* Documents (USEPA Region III, 2000). The RFI was conducted in accordance with the October 2002 MWH document titled *Facility Lead RCRA Corrective Action Revised Work Plan.* The Phase II RFI consisted of a continuing assessment and delineation of the Solid Waste Management Units (SWMUs) present at the site. The Phase II activities are described in detail in the USEPA approved MWH document titled *Work Plan Addendum*, dated June 2004, and the revisions incorporated in response to the August 2004 EPA comments.

1.1 REGULATORY HISTORY AND BACKGROUND

The Honeywell Facility, once part of the Allied Chemical Corporation Delaware Valley Works (later renamed AlliedSignal, Inc.), has been in operation for nearly 100 years. The Facility is located in a heavy manufacturing area on the Delaware – Pennsylvania state line and is surrounded by the Sun Oil Refinery to the north and east, the Epsilon Chemical Company to the northeast, the Amtrak rail line to the northwest, and General Chemical, who owns parcels of the north and south plant areas following the divestiture in 1986. On May 21, 1986, General Chemical Corporation acquired several parcels and associated operations of the Delaware Valley Works, totaling 100 acres. The remaining property (36 acres) and operations were retained by Honeywell. The surrounding area has historically been used for heavy manufacturing, and there are no plans to convert surrounding property to other uses.

Over the years, the Honeywell facility manufactured chemical products including pesticides (DDT and TDE), organic and inorganic acids, and various other specialty chemicals. Currently, Honeywell has three primary product lines: boron trifluoride (BF_3), a reaction catalyst used in a variety of process applications; oximino silanes, additives to silicone sealants; and Hocal, a chemical intermediate used in the agriculture industry. The Facility has always manufactured chemicals and the wastes generated by the chemical manufacturing process are highly diverse. In general, solid waste, gypsum, iron oxide mud, and alum mud are the waste types that were placed in the solid waste management units investigated as part of the RFI.

Based on the treatment, storage, and disposal of hazardous waste at the Honeywell Facility, a Notification of Hazardous Waste Activity was submitted to USEPA on July 28, 1980. For a detailed list of notifications/events see the Revised RFI Work Plan dated October 2002.

As of 2005, Honeywell acquired the General Chemical property on the North Plant. Honeywell assumed liability for soil and groundwater on the North Plant and groundwater on the South Plant. General Chemical retained liability for the soil on the South Plant.

1.2 PURPOSE

The Phase I RFI characterization, conducted in 2003, included a SWMU specific investigation of soil and groundwater quality, which included the assessment of the extent of eight SWMUs (SWMUs 9, 13, 14, 15, 17, 18, 19, and 20) and a site-wide groundwater assessment along the property. The findings of the Phase I RFI are summarized in the MWH document titled *Facility Lead RCRA Corrective Action RFI Data Summary Report* dated October 2003. The results of the Phase I were used to characterize the waste within each SWMU and assess the accuracy of the historically document SWMU dimensions. With the exception of SWMU 9, which did not need further delineation activities, the horizontal and vertical extent of each SWMU was redefined based on the Phase I findings. Five SWMUs (13, 14, 15, 19, and 20) were determined to require additional investigative work to complete the assessment.

The Phase II investigation included additional SWMU specific assessment activities at SWMUs 13, 14, 15, 19, and 20 and monitoring well installation for both SWMU specific and site-wide groundwater quality assessments. A more detailed description of the Phase II activities is presented in Section 2.0 and the results of the investigation are presented in Section 3.0 of this document.

2.0 SCOPE OF WORK

The following section provides a discussion of the field activities that were included in the Phase II RFI scope of work. The activities in this scope of work were designed to focus the investigation on data gaps identified during the Phase I investigation, including the completion of the definition of the nature and extend of SWMUs 13, 14, 15, 19, and 20. The specific investigative objectives for each SWMU are listed below:

- SWMU 13 – Continue the assessment of the horizontal extent of the SWMU, particularly in regards to the concrete pads encountered along the eastern boundary of the SWMU in the Phase 1 investigation. Assess the soil and groundwater quality beneath the concrete pads previously encountered in the SWMU.

- SWMU 14 – Confirmation of the northern and southern boundaries and continue the assessment of the western extent of the SWMU.

- SWMU 15 – Conduct additional investigative activities to characterize the soil and groundwater quality and assess the extent of the SWMU.

- SWMU 19 – Continue assessment of the extent of the SWMU and characterize the soil and groundwater quality beneath the concrete pad encountered in the SWMU during the Phase I investigation.

- SWMU 20 - Continue assessment of the extent of the shallow concrete pad and characterize the soil and groundwater quality beneath the shallow concrete pad encountered in the SWMU during the Phase I investigation.

- North Plant Groundwater Investigation – Installation of two upgradient monitoring wells (MW-08 and MW-09), one side gradient monitoring well (MW-11) and six monitoring wells (MW-05, MW-06, MW-07, MW-10, MW-12 and MW-13) downgradient from specific SWMUs.

- SWMU 9 Groundwater Investigation – Installation of six monitoring wells (MW-14 through MW-19) in the vicinity of SWMU 9.

The Phase II RFI activities were performed in accordance with the USEPA approved *Workplan Addendum* prepared by MWH, dated June 2004 and revised based on the August 2004 EPA comments to the Workplan. The detailed procedures for the implementation of the Phase II tasks are provided in the above referenced Workplan. Deviations from the Workplan, which occurred during the field investigation, are discussed in Section 2.1.

The field investigative activities were conducted from November 3, 2004 through January 17, 2005. Lancaster Laboratories, Inc. (LLI) of Lancaster, Pennsylvania analyzed all samples submitted for analysis of organic and/or metal parameters, with the exception of iodide. LLI subcontracted Severn Trent Laboratories of Westfield, Massachusetts to perform the iodide analyses.

Tables 1 and 2 summarize the soil and groundwater samples collected from each SWMU and the parameters analyzed. The analytical parameters were selected for each SWMU based on known wastes managed within the unit and historical sampling results, or were developed to analyze for a wider range of analytical parameters to capture other potential SWMU-related hazardous constituents not assessed historically.

2.1 DEVIATIONS FROM THE WORKPLAN ADDENDUM

2.1.1 Assessment of Soil and Groundwater Quality Beneath SWMU 19 Concrete Pad

During the Phase I test pit investigation in SWMU 19, the corner of what was believed to be a concrete pad was uncovered. The Workplan for the Phase II investigation proposed the collection of four soil samples and one Hydropunch® groundwater sample from beneath this concrete pad. During the Phase II investigation, six borings were advanced to 8 feet below ground surface (bgs) in the vicinity of the Phase I test pit (the exact location was inaccessible due to an above ground surface structure); the concrete pad was not encountered. Because a concrete pad was not located during the Phase II investigation, groundwater and soil samples were not collected from beneath the pad as intended. Nine additional borings were advanced around SWMU 19 and 21 samples were collected and analyzed for the purposes of further SWMU delineation.

2.1.2 Groundwater Quality Beneath SWMU 20 Concrete Pad

The Workplan proposed the collection of two groundwater samples, via the Geoprobe® Hydropunch® sampler, from beneath the shallow concrete pad in SWMU 20. Four borings were advanced through the concrete slab and refusal was encountered at approximately six feet bgs in each of the borings. Saturated conditions were not encountered; therefore groundwater samples could not be collected.

3.0 RESULTS AND DISCUSSION

This section presents the results of the Phase II RFI field investigation and discussions related to obtaining the objectives of each investigative task. The analytical results of each of the soil samples were screened against both the residential and industrial October 2004 USEPA Region III risk-based concentration (RBC) criteria. The RBC values for the non-carcinogenic compounds were converted to values corresponding to hazard quotients of 0.1. Additionally, any sample collected with a starting depth of less than two feet below ground surface was compared to the Ecological Screening Criteria as provided by R. Fish of Region III USEPA. The analytical results of each of the groundwater samples (from monitoring wells and Hydropunch® locations) were compared to the USEPA Maximum Concentration Levels and the RBCs for tap water published in July 2002. Appendix A presents the screening criteria used for each of the compounds analyzed in the 2004 soil and groundwater samples.

3.1 GEOLOGY/HYDROGEOLOGY

Sitewide Conditions

- The shallow subsurface at the majority of the Facility consists of an artificial fill material. The fill typically ranges from 0 to 7 feet below ground surface (bgs) and is underlain by fluvial unconsolidated deposits that extend to either a weathered rock zone (saprolite) or bedrock, which was encountered at approximately 16 to 19 feet bgs. At the adjacent General Chemical Site, the bedrock was reportedly encountered at depth ranging from approximately 16 to 54 ft bgs.

- Characteristic of the Coastal Plain sediments of the region, the principle water-bearing zone at the Facility consists of an unconsolidated sand and gravel. Water was encountered between 7 and 13 feet bgs during well installations. The interbedded sand and clay layers create some local partially confining conditions.

- Shallow water level data was collected as synoptic water level rounds in December 2004 and January 2005 from all monitoring wells on the Honeywell property and select wells on General Chemical property. Groundwater measurements are presented in Table 3 and Figures 2 and 3 present the potentiometric surface maps. The wells installed during the Phase II investigation provided further definition of the groundwater flow beneath the North Plant and SWMU 9.

- Local groundwater flows to the south and southwest from the site and discharges into the Delaware River. Groundwater flow within the water table aquifer at the site is controlled by the site's proximity to the Delaware River.

- Slug tests were conducted at each of the newly installed monitoring wells at the facility (MW-05 through MW-19) and results are presented on Table 4. The estimated hydraulic conductivities for the North Plant ranged from 0.0002 to 0.001 ft/day. The estimated hydraulic conductivities for SWMU 9 were similar and ranged from 0.00009 to 0.001 ft/day. Appendix C contains the slug test data.

- The hydraulic gradient on the eastern portion of the North Plant between wells MW-02 and MW-104 is approximately 0.005 ft/ft. The gradient on the western portion of the North Plant is more difficult to quantify due to the groundwater low present around MW-06. The groundwater gradient in SWMU 9 is also difficult to quantify due to the presence of the sluiceway on the western boundary of SWMU 9. The steepest groundwater hydraulic gradient is on the eastern side of SWMU 9, between MW-15 and MW-16, is approximately 0.015 ft/ft and discharges into the Delaware River. The hydraulic gradient within this portion of the SWMU is likely influenced by tidal fluctuations within the Delaware River.

North Plant

- Groundwater flow in the North Plant is towards the south and southwest to the Delaware River. Flow on the western portion of the North Plant has some variability. A slight groundwater low was evident around MW-06 during both rounds of water level monitoring. Additionally in December 2004, a slight mounding effect was observed along the western downgradient North Plant boundary.

- MW-06 is located in this groundwater low region and is also the monitoring well with the highest detected concentrations of organic compounds. Groundwater flow downgradient of MW-06 does not currently have a clear migration pathway and may represent a stagnation zone.

- Continued water level monitoring at select locations is needed to fully assess hydraulic conditions at the North Plant, particularly in regions of groundwater mounding and depression.

SWMU 9 (South Plant)

- Flow beneath SWMU 9 is generally towards the south and southwest but is highly influenced by the sluiceway near MW-18 on the western boundary of the SWMU, sheet piling along the Delaware River, and tidal fluctuations within the Delaware River. The sluiceway is scheduled for rehabilitation in 2005.

- Further investigation including additional rounds of synoptic water level measurements and an evaluation of the tidal influence are needed to further assess the groundwater flow beneath and around SWMU 9.

3.2 SWMU 13 SOIL

- The analytical results of the soil samples collected from SWMU 13 are presented in Tables 5 through 8. The sample locations and a summary of the organic and metal constituents that were detected above the regulatory screening criteria are presented on Figures 4 and 5, respectively. The full analytical data package for soil samples collected during the Phase II RFI is presented in Appendix B.

- The analytical results of the soil samples collected from the soil borings at SWMU 13 indicate exceedances of industrial RBC criteria for chlorinated volatile organic compounds, semi-volatile organic compounds (SVOCs), and metals. The chlorinated compound exceedances were greater towards the northern portion of the SWMU.

- Based on the Phase II sampling results, the eastern boundary of SWMU 13 has been extended. The area of soil in exceedance of industrial RBC criteria was expanded and the SWMU area currently includes approximately 14,000 ft^2. Soil quality conditions at SWMU 13 have been sufficiently delineated for purposes of remedy selection.

3.3 SWMU 14 SOIL

- The results of the soil samples collected from the test pits in SWMU 14 are presented in Table 9. Lithological logs of the test pits and a summary of the detected organic and metal constituents are presented on Figures 6 and 7, respectively. The full analytical data package for soil samples collected during the Phase II RFI is presented in Appendix B.

- The three test pits were excavated to further assess the north, south and western extents of SWMU 14. The test pit advanced to the northwest of SWMU 14 (TP-07) exhibited detections of organic compounds (primarily PAHs) at concentrations exceeding the industrial RBCs and similar to those detected in the Phase I samples from SWMU 14. Copper was also detected at an elevated concentration at TP-07.

- Arsenic was reported at a concentration above the industrial RBC in three test pits. The highest concentration of arsenic was reported in TP-07 (66.4 ug/kg). Iron (72,200 ug/kg), lead (1,190 ug/kg), and thallium (10.7J ug/kg) were also reported at concentrations above the industrial RBCs in TP-07. No other metals were reported above industrial RBCs.

- Based on the Phase II findings, the northwestern boundary of SWMU 14 was extended westward to include TP-07. The SWMU area is now approximately 13,700 ft^2. Assessment of the horizontal extent of SWMU is complete.

- The lithological logs of the test pits from the Phase I and Phase II investigations indicate that the maximum vertical extent of fill in the SWMU is 3.5 ft bgs.

- Based on the analytical results and lithological logs of the SWMU, no further assessment of the definition of the SWMU is warranted.

3.4 SWMU 15 SOIL

- The results of the soil samples collected from the test pits in SWMU 15 are presented in Table 10. Lithological logs of the test pits and a summary of the detected organic and metal parameters are presented on Figures 8 and 9, respectively. The full analytical data package for soil samples collected during the Phase II RFI is presented in Appendix B.

- Based on the results of the Phase II investigation, the delineation of SWMU 15 is complete.

3.5 SWMU 19 SOIL

- The results of the soil samples collected from SWMU 19 are presented in Tables 11 through 14. The sample locations and a summary of the organic compounds that were detected in the analytical results are presented on Figures 10 and 11. Metal parameters detected in the soil samples are presented on Figure 12. The full analytical data package for soil samples collected during the Phase II RFI is presented in Appendix B.

- Chlorobenzene and pesticide compounds continue to be the SWMU 19-specific characteristic compounds. SVOCs are not typically detected in the soil samples from the SWMU. Most of the SVOC detections occurring during the Phase II investigation are PAH compounds in shallow soil samples which are likely a result of being impacted by the overlying asphalt surface.

- Based on the Phase II soil sampling, the northern extent of SWMU 19 was extended toward the railroad tracks. The horizontal extent of the SWMU includes approximately 4,500 ft^2.

- Several samples collected from within SWMU 19 from a maximum of 12 feet bgs were impacted with pesticides. The water table is encountered at approximately 12 to 12.5 bgs within the SWMU, indicating that in several portions of the SWMU the soil column is impacted to the top of the water table.

- No further assessment of horizontal and vertical extent of SWMU 19 is warranted.

3.6 SWMU 20 SOIL

- The results of the soil samples collected from SWMU 20 are presented in Tables 15 through 18. The sample locations and a summary of the organic compounds that were detected in the analytical results are presented on Figures 13 and 14. Metal parameters detected in the soil samples are presented on

Figure 15. The full analytical data package for soil samples collected during the Phase II RFI is presented in Appendix B.

- Refusal was consistently encountered at six feet bgs in each of the borings advanced through the shallow concrete slab (SM20-GP11 through SM20-GP14) Refusal is believed to coincide with the concrete bottom of SWMU 20. Two geoprobe® locations attempted to the southeast (SM20-GP07 and SM20-GP08) encountered refusal at one foot bgs, indicating that the shallow concrete slab extends further to the southeast.

- With the exceptions of SM20-GP10, which was advanced to 12 feet bgs, each of the other samples advanced outside of the shallow concrete slab encountered refusal at six feet bgs.

- The horizontal extent of the shallow concrete pad has been defined. The soil quality beneath the concrete slab did not indicate impacts above the industrial RBC regulatory criteria. It has been documented that the backfill material used at SWMU 20 originates from SWMU 9 and may be the source of pesticides. The soil below the shallow concrete pad has been delineated.

- Soil samples beneath the deep concrete pad have not been collected. Further investigation in SWMU 20 is warranted beneath the concrete pad.

3.7 HYDROPUNCH® GROUNDWATER

Hydropunch® samples were collected for two reasons: to assess the groundwater conditions at multiple locations downgradient of a particular SWMU in an effort to determine the optimal well placement and/or to characterize the groundwater conditions within or below a SWMU.

SWMU 13

- The results of the Hydropunch® samples collected in and downgradient of SWMU 13 are presented on Tables 19 through 22. The sample locations and a summary of the compounds detected at each location are presented on Figure 16. The full analytical data package for Hydropunch® samples collected during the Phase II RFI is presented in Appendix B.

- Hydropunch® data collected from locations SM13-GP25 and SM13-GP26 were used to characterize the water beneath the concrete pads in SWMU 13. The results from Hydropunch® locations SM13-GP03 through SM13-GP06 were used to determine the optimum placement of monitoring well MW-13 downgradient of the SWMU.

SWMUs 15, 17 and 18

- The results of the Hydropunch® samples collected downgradient of SWMUs 15, 17, 18 are presented in Table 19. The sample locations and a summary of the compounds detected at each location are presented on Figures 17, 18, and 19, respectively. The full analytical data package for Hydropunch® samples collected during the Phase II RFI is presented in Appendix B.

- The Hydropunch® results from downgradient of SWMU 15 indicate groundwater impact (Figure 17). MW-10 was installed at the Hydropunch® location furthest towards the southwest of the SWMU, due to this being the anticipated area of greatest impact.

- In both SWMU 17 and SWMU 18 Hydropunches®, the analytical results from the Hydropunch® samples tended to be at higher concentrations than the permanent wells (MW-05 and MW-07) subsequently installed. The groundwater sample collected from beneath SWMU 17 during the Phase I

contained VOCs, but the analytical results of the downgradient water samples collected during the Phase II had lower concentrations of VOCs detected.

3.8 NORTH PLANT GROUNDWATER QUALITY

- Table 23 presents the well construction specifications for the newly installed and historical monitoring wells. Nine shallow monitoring wells were installed on the North Plant during Phase II activities. Well logs for the new wells are included in Appendix D.

- The results of the groundwater samples collected from the permanent site-wide monitoring wells are presented in Tables 24 through 27. Each monitoring well that was sampled on the North Plant was also sampled for general chemistry parameters, which are used in monitoring natural attenuation (MNA). MNA is believed to be the long-term groundwater remedial strategy. The general chemical parameters and the field parameters are presented in Table 28. The sample locations and a summary of the compounds detected at each of the monitoring wells on the North Plant are presented on Figures 20 and 21. The full analytical data package for groundwater samples collected during the Phase II RFI is presented in Appendix B.

- Monitoring wells MW-08 and MW-09 were installed as upgradient monitoring wells. Samples from both monitoring wells indicated low concentrations of pesticides and chloroform. Chloroform is not believed to be site-related constituent.

- Arsenic is present at a concentration above the tap water RBC in each sampled well in the North Plant, including the upgradient well MW-09. Arsenic was detected at concentrations exceeding the MCL in four wells: MW-01, MW-06, MW-12, and MW-13. These are the four wells with the highest organic constituent concentrations and lowest oxidation-reduction potentials in the North Plant. Reducing conditions tend to favor the mobilization of arsenic into groundwater.

- The natural attenuation of chlorinated VOCs in groundwater was evaluated for the water table aquifer using the preliminary screening weighting protocol outlined by USEPA. Table 29 presents the results of the semi-qualitative natural attenuation evaluation. Thirteen wells were evaluated and three wells were found to have "strong evidence" for anaerobic biodegradation of chlorinated organics: MW-01, MW-12, and MW-13. These three wells are located on the eastern portion of the North Plant, downgradient of SWMUs 13 and 14.

- The primary volatile organic constituents detected in groundwater consisted of benzene and chlorinated volatile organic compounds and their breakdown products. The process area of the North Plant and the area downgradient of SWMU 13 require further investigation.

3.9 SWMU 9 GROUNDWATER QUALITY

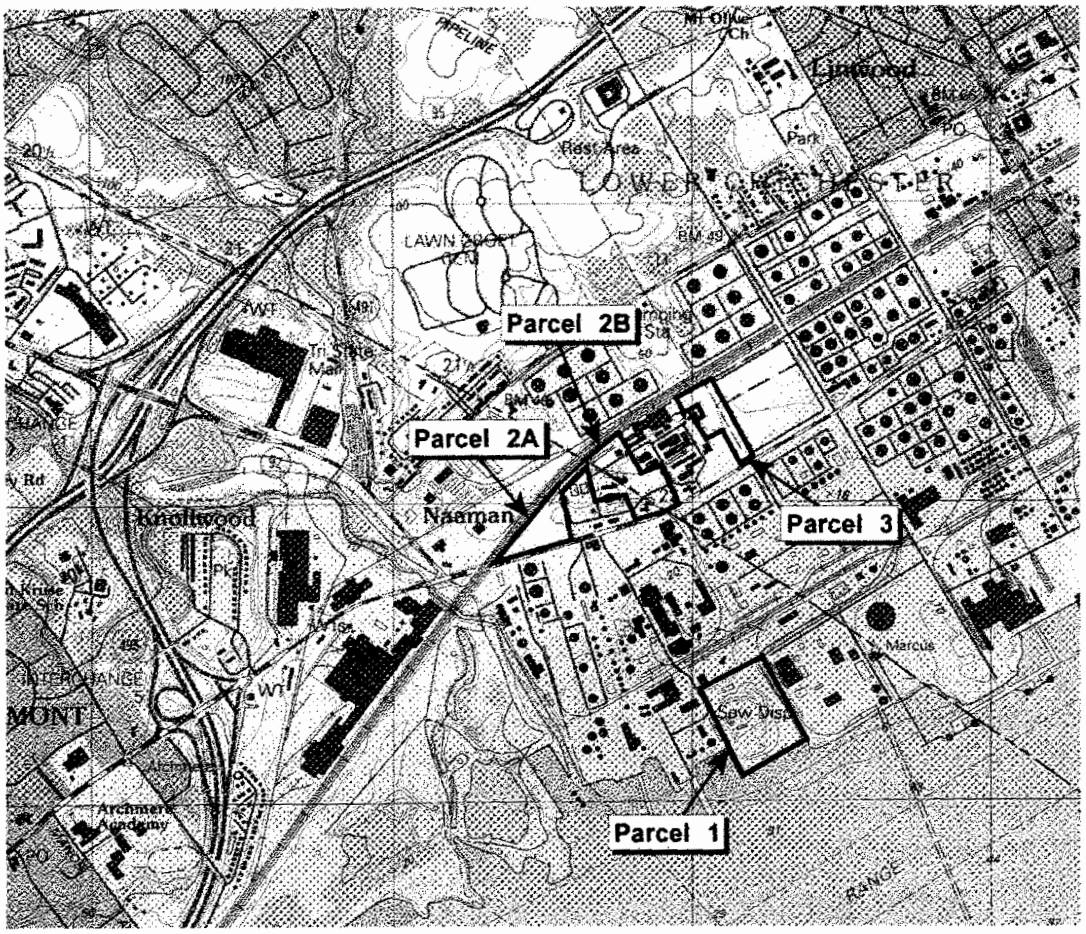
- Six monitoring wells were installed around SWMU 9 during the Phase II investigation (MW-14 through MW-19). Each of these wells and the existing upgradient well, MW-113, were sampled and analyzed for pesticides and metals. The analytical results of the samples collected from these wells are presented in Tables 26 and 27. SWMU 9 wells were also sampled for select geochemical parameters to assist in the characterization of the groundwater beneath SWMU 9 as presented in Table 16. The sample locations and a summary of the compounds detected at each of the sampled monitoring wells in SWMU 9 are presented on Figures 22 and 23.

- The results of the groundwater sampling event indicate that pesticides were detected at concentrations above RBC criteria in all wells and MCL criteria in three wells (MW-14, MW-18, and MW-19) in SWMU 9. The analytical results also indicate that arsenic was detected at elevated concentrations in the groundwater samples. The lowest pesticide concentrations were detected at the two wells closest to the Delaware River, MW-16 and MW-17.

- Arsenic was detected at a concentration above both the RBC and MCL in each well in SWMU 9, except MW-17. The detected concentrations of arsenic in SWMU 9 range from 6.8 to 65,800 ug/L. Elevated concentrations of arsenic may be partially due to local changes in the geochemical conditions. The wells in SWMU 9 with the highest detected concentrations of arsenic are also the wells with the lowest pH values. Decreases in pH of the groundwater can promote the desorption of arsenic from the iron-oxide surfaces to which it was previously bound.

- Further evaluation of the geochemical conditions, compound mobility, and migration pathways of pesticides and select metals, including arsenic is needed in SWMU 9.

FIGURES



QUADRANGLE LOCATION

Source: Marcus Hook Quadrangle, Pennsylvania-New Jersey-Delaware 7.5 minute series U.S.G.S. Topographic Quadrangle Maps, compiled from photographs taken 1989. Field checked 1991. Map edited 1993.

SCALE IN FEET

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10 000

CONTOUR INTERVAL 10 FEET

north

PHASE II RFI DATA SUMMARY REPORT
HONEYWELL CLAYMONT FACILITY, CLAYMONT, DELAWARE

SITE LOCATION MAP

MWH

FIGURE 1